REMARKS

Amendments

Prior to entry of the amendment set forth above, Claims 1-46 were pending, including eight independent Claims 1, 24, and 41-46. The amendment set forth above changes neither the number nor type of claims, such that after entry Claims 1-46 remain pending, including eight independent Claims 1, 24 and 41-46.

The amendment to the specification merely updates a priority application with its status and number as an issued patent. Support for amendments to the claims is set forth below.

The amendments to Claims 6-8 and 11 are supported by the definitions bridging pages 27-28, by page 29 lines 3-8, and page 38 lines 21-23. The amendments to Claim 14 are further supported by page 40 lines 4-7. Expected value E in Claim 27 is standard mathematical notation, also supported by page 34 lines 2-7. Amendments are also made to Claims 18, 20-21, 27, 30 and 35-40, supported similarly as the foregoing.

The current amendments to Claim 24 include some that reverse the amendments to Claim 24 that were submitted in the Applicant's previous response, dated December 13, 2005, and those amendments are, of course, supported by Claim 24 as originally filed. Further amendments to Claim 24 are supported, for example, by embodiments described with respect to FIGUREs 11 and 12. As to element (c) of Claim 24: the probing signal, as well as the weight vector and channel estimates, are typically generated for each particular receiver; as is now required (see definitions page 27 line 30 - page 28 line 4, defining that the subscript k reflects a particular user k, such that a weight vector w_m is for the mth MS receiver). Such probing signal may be based on the weight vector and the parameter set for the particular receiver, as is now required, as may be seen in the particular example of a probing signal as it is developed in block 304 and applied in block 306 of FIGURE 12. (Note that the subscript index identifying the particular receiver is omitted from FIGURE 12, as well as from most of the associated description; see page 33 lines 18-19.) The probing signals (here, perturbation vectors w_{even} and w_{odd}) are based in part on the present value of weight vector for the particular receiver, w_{base}. The probing signals are also based in part on a parameter set for the particular receiver, and on channel estimates for the other tracked receivers. In particular, a cochannel gain matrix Φ is defined in several places, such as Equation 2 on page 29 and at the bottom of page 30, as a summation over all K receivers of a function of the current channel estimate for each receiver(k), $k = 0$ to (K-1). Thus Φ reflects channel estimates for the other tracked receivers, in the manner now required, and also serves as an example

13

of <u>a parameter set for the particular receiver</u>, in that the channel estimates for the particular receiver are also included. The remaining amendment to element (c) merely clarifies the distinction between the particular receiver and the plurality of "other" receivers in the tracked receivers, and is supported by Claim 24 as originally filed.

Element (d) of Claim 24 is amended for consistency with element (c), supported, for example, by the stochastic gradient method of weight vector updating that is described on pages 33-37. Each particular MS (e.g., 229 in FIGURE 6, see page 35 lines 11-13) may produce a feedback bit based on evaluating reception of the probing signals (e.g., dedicated pilots to which even and odd weight vectors are applied in even and odd time slots) to determine whether reception is better during even periods or during odd periods. That the pilot is dedicated may be seen, for example, in the definition on page 28 line 1 together with the representation of the baseband transmitted signal set forth at page 28 line 7, which includes a dedicated pilot for each user k.

The foregoing remarks identify exemplary support for the amendments to Claim 24, but are not exhaustively detailed. In view of the complexity of the subject matter, the Examiner is respectfully requested to contact the undersigned at a provided contact number if any further clarification would be of assistance.

Claim Objections: In section 5 of the current Office Action, the Examiner objects to a labeling of "sub-act" in Claim 26. Upon review, such labeling has been changed in Claims 26, 28 and 30. To enhance clarity, outline reference numbers have also been changed in Claims 26-27, 30 and 34-37, but these changes do not affect the scope of the claims at all. Consequently, the claims as presently amended are improved, and the Examiner is thanked for his objection.

Rejections Under 35 USC 112

In section 6 of the current Office Action, the Examiner rejects Claims 24-40 as failing to comply with the written description requirement of 35 USC 112, first paragraph. It has been determined that the support indicated in the Applicant's previous response was based on a copy of the application as filed that differed significantly from that actually filed; had the support been properly identified, it is believed that the Examiner would not make this rejection. Nonetheless, because negative limitations are not preferred, Claim 24 is amended herein to substantially reverse the previous amendment, and then further amended to clarify requirements that are not disclosed or suggested by either Harrison or Dybdal. As set forth in more detail below in regard to rejections under 35 USC 102-103, both Harrison and Dybdal adaptively change antennae weighting vectors for a particular receiver based <u>only</u> on reception by that particular receiver. The

14

amendments to Claim 24 abundantly clarify a requirement that weights, or at least probing signals, for a particular receiver are modified based in part on channel estimates for other receivers. Taking channel estimates for other receivers into account for determining transmission factors for a particular receiver is foreign to Harrison and Dybdal, which accordingly fail to support *prima facie* obviousness of Claim 24 for at least that reason.

In section 7 of the current Office Action, the Examiner rejects Claim 46 as not enabled. Claim 46 is therefore broadened by the amendment set forth above by removing "general purpose." As to enabling use of a "computing device," which is still required, it is respectfully observed that Claim 46 as originally filed included a limitation to a (general purpose) computing device. Moreover, transmitters and receivers in communications systems such as CDMA cellular networks typically incorporate computing devices, some form of which is necessary to perform the numerous high-speed computations that are required to solve the equations, such as those set forth in the Applicant's specification, that are integral to such communications. Said differently, the use of computing devices in communication systems is so well understood by the person of ordinary skill in the art that the suggestion of such computing devices in Claim 46 as originally filed is sufficient to enable implementation of the limitation. At least in view of the present amendment of Claim 46, withdrawal of this ground of rejection is respectfully requested.

In section 8 of the current Office Action, the Examiner rejects Claims 6-8, 11, 14-18, 20-23, 27-28, 30-31 and 35-40 as indefinite. It is respectfully submitted that these claims, as previously amended, fully satisfied the requirements of 35 USC 112, second paragraph. It is noted that a claim is not indefinite unless it is "insolubly ambiguous." "We have held that a claim is <u>not indefinite merely because it poses a difficult issue of claim construction</u>; if the claim is subject to construction, i.e., it is not insolubly ambiguous, it is <u>not invalid for indefiniteness</u>." (underlining added) *Bancorp Services, L.L.C., v. Hartford Life Insurance Company*, 359 F.3d 1367 at 1372 (Fed. Cir. 2004), citing *Honeywell Int'l, Inc. v. ITC*, 341 F.3d 1332, 1338-39 (Fed. Cir. 2003). It is respectfully submitted that the claims as previously pending fully satisfied this very low threshold requirement for definiteness. The equations at issue are set forth and explained clearly in the Applicant's specification, and it is therefore unnecessary to import all of such explanation into the claims to render them definite. In order to advance prosecution, however, the Applicant amends the rejected claims herein in compliance with the Examiner's repeated demands for further definition. The Applicant reserves, however, a right to withdraw any such amendments without prejudice, as if they had never been entered, at any time that amendments of the application are permitted. It is respectfully submitted that each of these

rejected claims, as presently amended, more than amply satisfies the requirements of 35 USC 112, second paragraph.

Rejections Under 35 USC 102

In section 9 of the current Office Action, the Examiner rejects Claims 1-4, 19, 42-44 and 46 as anticipated by Dybdal. This ground of rejection is respectfully traversed. Dybdal is directed to adaptive transmitter methods in a manner intended to reduce multi-path signals to a single receiver. Dybdal adaptively updates a weight vector set for transmissions to a particular receiver, but does not take any account of other receivers when doing so. The method of Dybdal addresses only a target receiver, and the power delivered to other, non-target receivers has no bearing whatsoever on the antennae weightings for signals to such target receiver. As such, Dybdal has no use for an inverse cost function, as defined in, *e.g.*, Claim 1, so it is not surprising that Dybdal fails to disclose, teach or fairly suggest any such function. Thus lacking an important element of each of the Applicant's independent claims 1, 42-44 and 46 that are rejected on this ground, Dybdal cannot even support *prima facie* obviousness of any of those independent claims, let alone anticipate them. Consequently, each of those independent claims, and each claim properly depending from any of them, is unanticipated by Dybdal, at least by virtue of properly depending from one of the independent claims. More detailed support for this conclusion is set forth in the following remarks.

Claim 1: Element (b) of the Applicant's Claim 1 recites (underlining added for emphasis):

> b) updating the weight vector set based on an inverse cost function, a value of which increases when power calculated as delivered to a target receiver increases and decreases when power calculated as delivered to non-target receivers increases;

This element introduces the inverse cost function as a basis for updating the weight vector set. The value of the inverse cost function rises when power delivered to the target receiver rises, but falls when power delivered to non-target receivers rises. (To be precise, of course, the calculations are based on calculated power, but that technicality will be ignored to simplify the remarks). The target and non-target receivers are different receivers, as is apparent from their different names. That they are different receivers is also logically necessary, because the value of the inverse cost function responds differently (indeed, oppositely) to power delivered to targets, as compared to power delivered to non-targets.

The different receivers, *i.e.* the target receiver and the non-target receivers, of element(b) of Claim 1 should not be confused with the different signal images in Dybdal, whereby a single transmitted signal travels

by a plurality of paths having different lengths (some paths include reflections) and hence arrives at a particular receiver at a plurality of different times. Dybdal deals exclusively with such reflected signal components, which result in a plurality of time-displaced versions of a same signal delivered to a same receiver. The Applicant's Claim 1, by contrast, contains limitations regarding reception of a transmitted signal by different receivers, in particular basing the weighting calculation on an inverse cost function, which in turn takes into account the signal effect on a plurality of different receivers.

The Examiner inadvertently fails to actually assert that Dybdal discloses the limitations of element (b) of Claim 1 that are set forth above. On page 5 of the current Office Action, the Examiner provides a rationale in support of his contention that Dybdal discloses each limitation of the Applicant's Claim 1 (among others). That rationale states in part (underlining added for emphasis): "Therefore, the algorithm decreases the value of the reflected components to maximize the power delivered to the proper receiver." This statement by the Examiner correctly reflects the intended effect of the teaching of Dybdal (except the term "proper" should be omitted as irrelevant and somewhat misleading, in view of the fact that Dybdal addresses only one receiver at a time, and has nothing to do with "improper" receivers). However, such effect -- decreasing the value of the reflected components to maximize the power delivered to the proper receiver -- is not the function performed by the "inverse cost function" that is recited, and defined, in the Applicant's Claim 1. The inverse cost function does not reflect only the power delivered to the "proper" (*i.e.*, target) receiver, but also reflects power delivered to the "improper" (*i.e.*, non-target) receivers. Dybdal simply has no function remotely like the inverse cost function.

As noted above, the Examiner's rationale in support of this rejection fails to assert that Dybdal discloses all of the limitations of element (b) of Claim 1, whether in the portion of the rationale quoted above, or elsewhere. As such, the Examiner fails to identify evidence sufficient to support *prima facie* obviousness of Claim 1 over Dybdal. Irrespective of the sufficiency of the provided rationale, however, Dybdal fails to disclose, teach or fairly suggest all of the limitations of the Applicant's Claim 1, particularly those of element (b) as indicated above. To anticipate a claim, of course, a reference must include all significant limitations of a claim. Lacking disclosure of important limitations of element (b) of Claim 1, Dybdal clearly fails to anticipate Claim 1.

Identifying further limitations of Claim 1 that are omitted by Dybdal would be cumulative. While no such further distinguishing limitations are identified presently, however, they are not waived, but are reserved for future presentation if and as needed.

17

Claims 42-44 and 46: It is respectfully submitted that the remaining independent Claims 42-44 and 46, which the Examiner rejects as anticipated by Dybdal, are not anticipated by Dybdal for substantially the same reasons as are set forth above with respect to Claim 1. For example, the Applicant's Claim 42 recites in part, in element (b) (underlining added for emphasis):

> a) a transmitter, capable of initializing a parameter set and a weight vector associated with the transmitter and updating the weight vector <u>based on an inverse cost function, a value of which increases when power calculated as delivered to a target receiver increases and decreases when power calculated as delivered to non-target receivers increases,</u> and updating the weight vector means, and generating even and odd probing signals, for updating the parameter set;

Similar language to that of Claim 42 which is set forth above, particularly the underlined portions, is recited in the corresponding element (b) of each of Claims 43-44 and 46. Each of these independent claims thus includes limitations similar to those discussed above with respect to Claim 1. Accordingly, as can therefore readily be seen, the remarks set forth above to demonstrate that Claim 1 is not anticipated by Dybdal apply equally to Claims 42-44 and 46, and support a conclusion that Claims 42-44 and 46, as presently amended, are also not anticipated by Dybdal.

The remarks set forth above demonstrate that Dybdal fails to anticipate any of Claims 1, 42-44 and 46. Dybdal therefore also fails to anticipate any of Claims 2-4 or 19, at least by virtue of their proper dependency on Claim 1. As such, the Examiner is respectfully requested to withdraw this ground of rejection.

Rejections Under 35 USC 103

In section 10, on page 7 of the current Office Action, the Examiner rejects 9-10, 12-13, 41 and 45 as obvious over Dybdal in view of Harrison. This ground of rejection is respectfully traversed. Like Dybdal, Harrison fails to disclose the "inverse cost function" as set forth in Claim 1, and hence Harrison fails to remedy the deficiency of Dybdal in this regard. Consequently, the combination fails to render Claim 1 obvious for at least the reasons set forth above that distinguish Claim 1 from Dybdal. Claims 9-10 and 12-13 are therefore nonobvious over this combination of references at least by virtue of depending from Claim 1.

As to independent Claims 41 and 45, each of these claims include a requirement at least similar to the following (underlining added for emphasis): "[U]pdating the plurality of baseband transmit weight vectors based on <u>a metric of a cross interference</u> and a plurality of channel estimates." Cross interference, like an inverse cost function, entails consideration of the impact of a transmission on different receivers. "Cross

interference" is reasonably exemplified by the "cochannel gain matrix" that forms a part of Equation 2. A person skilled in the art will readily see that the cochannel gain matrix in Equation 2 is based in part on a calculation of the interference power transmitted to proximate receivers other than the target, which is a portion (the denominator) of the general inverse cost function. It is the explicit consideration of interference to other receivers (cross interference) that enables some embodiments of the claimed invention to provide "nulling" of interference to receivers other than the target receiver. Thus, the metric of cross interference is a feature that distinguishes the invention claimed in Claims 41 and 45 from more conventional plural-antenna weighting systems, such as taught by Dybdal and Harrison, which focus only on the power delivered to a single target.

Neither Dybdal nor Harrison disclose or teach a feature comparable to the recited "cross interference" metric, and accordingly the two together do not support *prima facie* obviousness of either of these claims. Indeed, the Examiner acknowledges the failure of Dybdal in this regard. Moreover, the Examiner inadvertently neglected to point to any specific portion of Harrison as describing what might reasonably be called "a metric of a cross interference" for adjusting weight vectors. "Cross interference" is reasonably clear in referring to interference with other receivers. Neither Harrison nor Dybdal describes taking account of effects on other receivers when adaptively adjusting antennae weights for a particular receiver. Both Harrison and Dybdal describe only calculations that consider the target (subscriber) receiver, and thus cannot fairly be said to base weight vectors on a metric of a cross interference.

Double Patenting

In section 11 of the current Office Action, the Examiner rejects Claims 22-26 and 32-34 for non-statutory double patenting over Claim 2 of U.S. Patent 6,952,455 ("the '455"). It is respectfully submitted that the '455 (including Claim 2), like Harrison and Dybdal, fails to take account of responses of other receivers when adapting antennae weights for a particular receiver. As such, the '455 cannot remedy the failure of Harrison and Dybdal to disclose all of the limitations of any of the independent claims as currently amended. In particular, the '455 (including Claim 2) at least fails to disclose the "inverse cost function" as defined in Claim 1, and also fails to disclose "generating a transmit probing signal for each particular receiver based on the weight vector and parameter set for the particular receiver and on channel estimates for each of a plurality of tracked receivers" as required by Claim 24 as currently amended. Claims 22-23 include the limitations of Claim 1 by virtue of dependency, and Claims 24-26 and 32-34 include the limitations of Claim 24 at least by virtue of dependency. Accordingly, each of these claims, as presently amended, is nonobvious over the '455.

As such, a double patenting rejection is not warranted, and the Examiner is therefore respectfully requested to withdraw this ground of rejection as to each of these claims.

Conclusion

It is respectfully submitted that the amendment and remarks set forth above overcome each ground of rejection set forth by the Examiner. As such, the Examiner is respectfully requested to reconsider the application, to withdraw all previous rejections, and, barring the discovery of new grounds for rejection, to promptly issue a Notice of Allowance of all pending claims.

The Commissioner is authorized to construe this paper as including a petition to extend the period for response by the number of months necessary to make this paper timely filed. Fees or deficiencies required to cause the response to be complete and timely filed may be charged, and any overpayments should be credited, to our Deposit Account No. **50-0490**.

Respectfully submitted,

_7/7/2006_
Date: July 7, 2006

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20